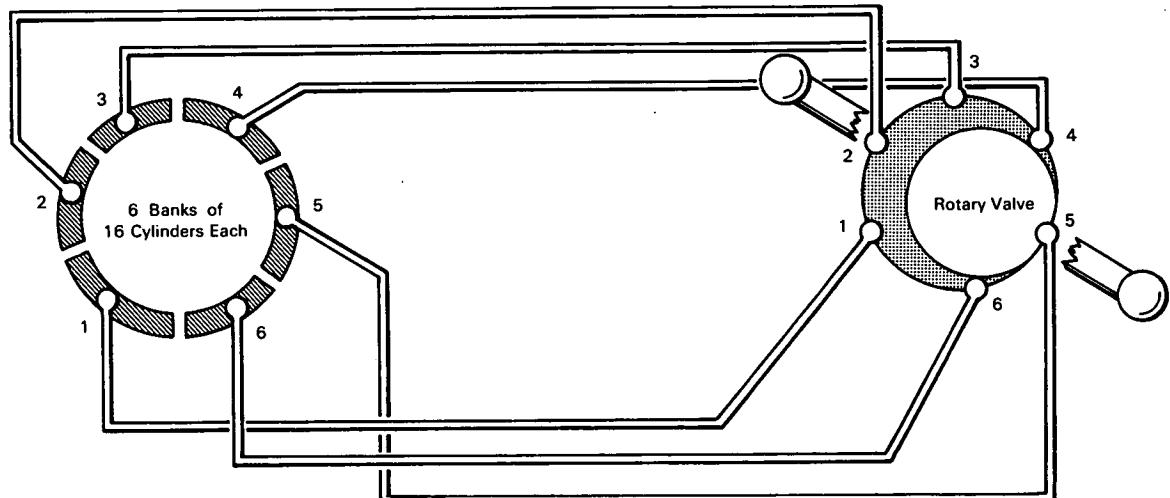


# NASA TECH BRIEF



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## Rotary Valve Controls Multiple Hydraulic Leveling Cylinders



### The problem:

To control a circular bank of cylinders that are used to maintain large loads within  $\pm 3$  arc minutes of a true vertical position.

### The solution:

A single rotary valve is used to control the position of one of several groups of supporting hydraulic cylinders. The position of each group of cylinders is controlled in such a way that if the cylinders on one side are raised, the cylinders on the opposite side are lowered. Those cylinders in between are lowered or raised varying amounts depending upon their relative position.

### How it's done:

The leveling system shown in the illustration is

controlled by the rotary valve. The valve cavity has inlet ports to a common pressure source and outlet ports to the various cylinder banks. Each outlet port has the same relative position as the cylinder bank to which it is connected. The center rotary section spool of the valve is eccentrically mounted. The position of the spool determines the flow rate to each bank of cylinders and hence the cylinder position.

The fluid flows into the cavity through inlet ports around the annular grooves cut in the spool (on either side of the exit ports) and out the exit ports to the cylinders. The outlet port closest to the high part of the eccentric has the lowest flow rate and the greatest pressure drop between the source and the cylinder. The other exit ports have varying flow rates depending upon their position.

(continued overleaf)

**Notes:**

1. This rotary valve allows the control of several hydraulic cylinder banks with one valve. Different flow rates for the cylinders between the two extremes of the eccentric spool can be obtained by changing the shape of the spool.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B66-10402

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Boeing Aircraft Corporation  
under contract to  
Marshall Space Flight Center  
(M-FS-361)